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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

MAR 30 1994

FEDERAL COMMUNICATIONS COMMISSION
OFFICE OF SECRETARY

In the Matter of

Amendment of the Commission's
Rules to Establish New Personal
Communications Services

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GEN Docket No. 90-314,
RM-7140, RM-7175, RM-7618
PP-6 through PP-10, PP-12,
PP-13, PP-15 through PP-20,
PP-26, PP-27, PP-41 through
PP-52, PP-54 through PP-68,
PP-70, PP-72 through PP-78

PETITION FOR RECONSIDERATION
OF
QUALCOMM INCORPORATED

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SUMMARY

In this petition, QUALCOMM seeks reconsideration of the Commission's *Third Report and Order* in GEN Docket No. 90-314 wherein the Commission denied a pioneer's preference to QUALCOMM and granted a preference to Omnipoint Communications, Inc. As QUALCOMM will show, the *Third Report and Order* is replete with material errors and omissions and does not contain a rational explanation for the pioneer's preference decisions.

As QUALCOMM establishes herein, the Commission ignored, misunderstood or failed to give adequate weight to record evidence of QUALCOMM's contribution to the development of PCS technology. The record in this proceeding demonstrates that QUALCOMM has satisfied the Commission's pioneer's preference criteria with its work in signal and system design including baseband engineering. As QUALCOMM has noted in previous filings in this docket, it is responsible for at least four "breakthroughs" in digital baseband engineering which have helped bring PCS to reality: (1) the coding and signal processing subsystems that incorporate QUALCOMM's spread spectrum wave form design; (2) the power control system; (3) the soft handoff system, and (4) the RAKE receiver. The technical feasibility of these technological innovations and the contribution of QUALCOMM's experiments implementing this technology to the development of the Commission's PCS rules is not in dispute.

This petition also demonstrates that Omnipoint has failed to satisfy the pioneer's preference criteria and is undeserving of an award of a preference. The Commission, in considering Omnipoint's technology, failed to make a rational connection between its findings of fact and the evidence in the record and, where it did make such connections, made findings of fact which were often contradicted by the record. Neither Omnipoint nor the other applicants using Omnipoint's equipment has presented the Commission with evidence of technological development sufficient to warrant an award to Omnipoint. Moreover, the experimental reports filed by Omnipoint and other applicants indicate that Omnipoint has not, and cannot, establish

the technical feasibility of its technology. As QUALCOMM explains herein, the Commission's reliance on reports cited by Omnipoint to justify its finding of technical feasibility was misplaced.

The *Third Report and Order* is also defective because the Commission failed to engage in any independent analysis of the technical record. In addition, the text is so riddled with errors as to call into question the integrity of the entire decision. Moreover, grant of a preference to Omnipoint undermines the policies behind the pioneer's preference rules, which seek to encourage full disclosure of innovative technology. Omnipoint's refusal to reveal key elements of its proposed system runs counter to the notion that the otherwise qualified innovator is given an automatic right to obtain a license for a new service in return for disclosing proprietary information. Finally, QUALCOMM notes that the Commission applied inconsistent standards by denying QUALCOMM a preference based on the erroneous conclusion that QUALCOMM has merely adapted earlier work at the same time that the Commission awarded a preference to Omnipoint for adapting its ISM band equipment to the PCS band.

For these reasons, QUALCOMM seeks reconsideration of the *Third Report and Order*. Specifically, QUALCOMM asks that the Commission grant QUALCOMM's request for a pioneer's preference and rescind the previous award to Omnipoint.

TABLE OF CONTENTS

	<u>Page</u>
I. The Third Report and Order Incorrectly Denies QUALCOMM A Pioneer's Preference	2
A. The Commission's Analysis of QUALCOMM's Application	2
B. The Pioneer's Preference Criteria	4
C. QUALCOMM Has Satisfied the Pioneer's Preference Criteria	4
1. The First Criterion - Technological Development	5
2. The Second Criterion - Technical Feasibility	7
3. The Third Criterion - Reasonable Outgrowth	8
II. The Commission Should Reconsider Its Grant of a Preference To Omnipoint	9
A. Omnipoint Has Failed to Satisfy the Commission's Pioneer's Preference Criteria	9
1. The First Criterion - Technological Development	9
2. The Second Criterion - Technical Feasibility	10
(a) Reports about System Functionality	11
(i) American Portable Telecommunications	11
(ii) Ameritech	12
(iii) Cox	13
(iv) Southwestern Bell	14
(v) Time Warner	14
(b) Frequency Sharing	15
(c) PSTN Compatibility	17
(d) Multiple Access/Frequency Reuse	18
3. The Third Criterion - Reasonable Outgrowth	19

B.	The Third Report and Order's Grant of a Preference to Omnipoint is Procedurally Defective	19
C.	Grant of a Preference to Omnipoint Undermines the Policies Behind the Pioneer's Preference Rules	22
IV.	The Commission Applied Inconsistent Standards	23
V.	Conclusion	25

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PETITION FOR RECONSIDERATION

QUALCOMM Incorporated ("QUALCOMM"), by its attorneys, hereby requests that the Federal Communications Commission (the "FCC" or "Commission"), pursuant to 47 C.F.R. § 1.106, reconsider its *Third Report and Order* in the above proceeding.^{1/} There, the Commission granted three requests for pioneer's preferences for personal communications service ("PCS") licenses^{2/} and denied 47 other requests, including a request filed by QUALCOMM.^{3/}

As QUALCOMM will show, the *Third Report and Order* is replete with material errors and omissions and does not contain a rational explanation for the pioneer's preference decisions. First, the Commission ignored, misunderstood or failed to give adequate weight to record evidence of QUALCOMM's contribution to the development of PCS technology. Second, the Commission, in considering Omnipoint's technology, failed to make a rational connection between its findings of fact and the evidence in the record and, where it did make such connections, made findings of fact which

^{1/} *Amendment of the Commission's Rules to Establish New Personal Communications Services*, GEN Docket No. 90-314 (Feb. 3, 1994), summarized at 59 Fed. Reg. 9419 (Feb. 28, 1994) ("*Third Report and Order*").

^{2/} The pioneer's preference regulations are codified at 47 C.F.R. §§ 1.402, 1.403 & 5.207 (1992).

^{3/} In the *Tentative Decision* in GEN Docket No. 90-314, *Amendment of the Commission's Rules to Establish New Personal Communications Services*, 7 FCC Rcd 7794 (1992) ("*Tentative Decision*"), the Commission tentatively granted pioneer's preferences for a PCS license to American Personal Communications ("APC"), Cox Enterprises, Inc. ("Cox") and Omnipoint Communications, Inc. ("Omnipoint"). In the *Third Report and Order*, the Commission dispositively granted these pioneer's preferences to APC, Cox, and Omnipoint and denied all other applications.

were often contradicted by the record. Third, the *Third Report and Order* is so riddled with factual misstatements and technical errors as to cast serious doubt upon "reasoned decision-making." Fourth, the Commission has undermined the pioneer's preference policies it sought to implement in the *Third Report and Order*. Finally, the Commission acted unreasonably when it granted Omnipoint a preference for a 2 GHz proposal which is, clearly, an adaptation of work done at 902-928 MHz, while denying QUALCOMM a preference because it found QUALCOMM had "adapted" previous work.

The Commission has recognized that reconsideration is warranted when Commission decisions include "manifest error or omissions so material that their corrections will result in substantial alteration of the original decision."^{4/} Thus, the Commission must articulate a satisfactory explanation for its actions in this proceeding, including a rational connection among the record evidence, the findings of fact and its decision.^{5/}

I. THE THIRD REPORT AND ORDER INCORRECTLY DENIES QUALCOMM A PIONEER'S PREFERENCE

The record shows that QUALCOMM has met the necessary criteria for grant of a pioneer's preference. The Commission's failure to apply those criteria and award a preference to QUALCOMM should be reconsidered.

A. The Commission's Analysis of QUALCOMM's Application

The Commission's explanations of why it denied QUALCOMM's pioneer's preference request are confusing, inconsistent, and contradictory. In the *Tentative Decision*, the Commission stated that

^{4/} *WWIZ, Inc.*, 37 FCC 685, 686 ¶ 2 (1964), *aff'd sub nom., Lorain Journal Co. v. FCC*, 351 F.2d 824 (D.C. Cir. 1965), *cert. denied*, 383 U.S. 967 (1966). Furthermore, under the Administrative Procedure Act, an agency's actions in connection with informal adjudication are invalid if they are "arbitrary, capricious, an abuse of discretion, or otherwise not in accordance with law." 5 U.S.C.S. § 706(2)(A) (Law. Co-op. 1989 & Supp. 1993).

^{5/} *Motor Vehicle Mfrs. Ass'n v. State Farm Mutual*, 463 U.S. 29, 43 (1983), *citing Burlington Truck Lines, Inc. v. United States*, 371 U.S. 156, 168 (1962); *Citizens to Preserve Overton Park v. Volpe*, 401 U.S. 402, 416 (1971); *Greater Boston Television Corp. v. FCC*, 444 F.2d 841, 851 (D.C. Cir. 1970), *citing WAIT Radio v. FCC*, 418 F.2d 1153, 1156 (D.C. Cir. 1969); *ALLTEL Corp. v. FCC*, 838 F.2d 551, 556 (D.C. Cir. 1988); *David Ortiz Radio Corp. v. FCC*, 941 F.2d 1253, 1260 (D.C. Cir. 1991). *See also Teleprompter Cable Sys., Inc. v. FCC*, 543 F.2d 1379, 1385 (D.C. Cir. 1976) (holding that agencies are bound by their rules and regulations and may not deviate from them on an ad hoc basis); *Sangamon Valley Television Corp. v. United States*, 269 F.2d 221, 224 (D.C. Cir. 1959).

"QUALCOMM has not indicated to us that it has in fact developed and tested 2 GHz equipment."^{6/} In the *Third Report and Order*, the Commission restated that, at the time of its *Tentative Decision*, it had "found no evidence that QUALCOMM had developed and tested its system at 2 GHz, nor that it was designed or could work on a spectrum sharing arrangement at 2 GHz."^{7/}

However, the Commission was wrong. The Commission cited to the very evidence it claimed it lacked; the *Tentative Decision* credited APC with demonstrating "the technical feasibility of its system through testing . . . CDMA access techniques configured into 1.25 MHz frequency division duplexed channels."^{8/} By noting that "this technology was developed by QUALCOMM,"^{9/} the Commission admitted that it had the evidence of the feasibility of the system which it claimed it lacked.

Perhaps recognizing that it had made a fundamental error in the *Tentative Decision*, the Commission, in the *Third Report and Order*, invented a new reason for denying QUALCOMM a pioneer's preference: the Commission's "continued belief" that most of the "technological developments and patents associated with QUALCOMM's proposal were developed for implementation of its 800 MHz digital cellular system."^{10/} The use of ever shifting rationales and the Commission's willingness to change reasons in mid-proceeding to arrive at a pre-ordained result undermine any claim to reasoned decision-making in the *Third Report and Order*.

^{6/} *Tentative Decision* at ¶ 32.

^{7/} *Third Report and Order* at ¶ 259.

^{8/} *Tentative Decision* at ¶ 8.

^{9/} *Id.* at 7798 n.8. The Commission is only telling part of the story. Not only did QUALCOMM develop the technology; it designed, developed, manufactured and installed the CDMA system that APC used to verify its FAST technology. In addition QUALCOMM engineers and technicians worked side-by-side with APC personnel to conduct the tests reported on by APC.

^{10/} *Third Report and Order* at ¶ 266.

B. The Pioneer's Preference Criteria^{11/}

The Commission's pioneer's preference rules are "a means of extending preferential treatment in its licensing process to parties that demonstrate their responsibility for developing new communications services and technologies."^{12/} This policy statement supports the *Third Report and Order's* more precise articulation that a pioneer's preference applicant must:

- (1) demonstrate that it has developed the new service or technology, *e.g.*, that it has developed the capabilities or possibilities of the service or technology or has brought the service or technology to a more advanced or effective state; and
- * * *
- (2) demonstrate the technical feasibility of the new service or technology, either by submitting a technical feasibility showing or having submitted at least preliminary results of an experiment.^{13/}

Finally, the *Third Report and Order* sets forth another requirement:

a preference will be granted only if the rules adopted are a reasonable outgrowth of the proposal and lend themselves to grant of a preference.^{14/}

As QUALCOMM has shown repeatedly throughout this proceeding, and will now show again, its PCS technology has more than satisfied these three criteria.

C. QUALCOMM Has Satisfied the Pioneer's Preference Criteria

Stated simply, QUALCOMM has developed a complete digital PCS system incorporating several pioneering innovations, that will be the keystone of the new PCS industry. On

^{11/} The Commission's pioneer's preference criteria have not been uniformly articulated within this proceeding or throughout other proceedings which have considered pioneer's preferences. The ever-changing language used to describe the criteria may be likened to quicksilver in permanence and solidity. Nonetheless, QUALCOMM relies upon the language of the *Third Report and Order* for purposes of this Petition.

^{12/} *Third Report and Order* at ¶ 3.

^{13/} *Id.* at ¶ 4. See also 47 C.F.R. § 402(a).

^{14/} *Third Report and Order* at ¶ 4. The Commission goes on to clarify that the final rules need not be identical to the innovator's original proposal. *Id.*

reconsideration, the Commission should correct its error in not granting QUALCOMM a pioneer's preference.

1. The First Criterion - Technological Development

In denying QUALCOMM's pioneer's preference request, the Commission stated its belief that:

most of the technological developments and patents associated with QUALCOMM's proposal were developed for implementation of its 800 MHz digital cellular system.^{15/}

The Commission found that adapting this work to the 2 GHz PCS band is not innovative. Also, the Commission recognized that QUALCOMM has done "work at 2 GHz on exclusion zones around microwave towers, the use of smaller cells, and remote antennas."^{16/} However, the Commission was "unable to identify a specific significant aspect of this work that is innovative and for which QUALCOMM is responsible."^{17/}

These two statements, both of which refer to radio frequencies, lie at the heart of the Commission's denial of QUALCOMM's pioneer's preference request and are evidence of the Commission's misunderstanding of that request. **QUALCOMM does not seek a preference for its work in radio frequency engineering.** While challenging and difficult, that work is not innovative. Rather, QUALCOMM seeks a pioneer's preference for its work in signal and system design including digital baseband engineering, particularly its development of CDMA technology. As

^{15/} *Third Report and Order* at ¶ 266. QUALCOMM does not believe that the record contains sufficient evidence for this statement. As far as QUALCOMM is aware, the only information in the record concerning QUALCOMM's patents is contained in its June 10, 1992 Comments at Appendix A. That Appendix lists seven patents awarded to QUALCOMM for its work in CDMA technology, not for its work at "800 MHz." Indeed, there is nothing in the relevant patents that relates to the radio frequency at which the technology can operate. The Commission may be confused because some of the patents include the word "cellular" in their title. But that term is used to describe a communications system that includes cellular frequency reuse -- as PCS will. The relevant QUALCOMM patents cover the use of its inventions at all frequencies, not just "800 MHz".

^{16/} *Id.* at ¶ 266.

^{17/} *Id.* (emphasis added).

Advanced Mobilecom Technologies, Inc. and Digital Spread Spectrum Technologies, Inc. ("AMST/DSST") recently pointed out:

the paramount technical challenge in the design of PCS spread spectrum radios is the development of the digital baseband and not the design of the radio frequency segment.^{18/}

As the record shows, QUALCOMM has done significant pioneering work in signal and system design including digital baseband engineering. Since its founding in 1985, QUALCOMM has been developing CDMA technology, which it first applied to the solution of satellite communications problems.^{19/} QUALCOMM also realized that if certain fundamental problems could be solved, CDMA could become the ideal technology to provide a variety of terrestrial wireless communications services, including 1800 MHz PCS, 800 MHz cellular and wireless local loop service.

In short, QUALCOMM did not develop CDMA "for implementation of its 800 MHz digital cellular system" as the Commission "continues to believe". Cellular is merely one application of the technology that will allow PCS to come to fruition. QUALCOMM believes that it is significant that the first complete CDMA system that it sold (to APC) was an 1800 MHz system, not an 800 MHz cellular system.

QUALCOMM agrees with AMST/DSST that the truly "cutting edge" work in PCS is the system and signal design and underlying digital baseband engineering. Failure to reward QUALCOMM for its outstanding work in this area is a fatal flaw in the *Third Report and Order*, one that is compounded by misunderstanding of the comments previously filed in this proceeding. Specifically, the *Third Report and Order* noted the Commission's apparent "agreement" with AMT/DSST in finding "that QUALCOMM did not qualify for a preference because many of its

^{18/} AMST/DSST Joint Petition for Reconsideration, GEN Docket No. 90-314 at 15-16 (March 7, 1994) ("Joint Petition"), citing *Third Report and Order* at ¶ 79 n.86.

^{19/} QUALCOMM Comments, GEN Docket No. 90-314 at 2 (Jan. 29, 1993).

innovations were designed for implementation at cellular frequencies,"^{20/} but AMT/DSST recently stated "that they have not opposed and do not oppose the grant of a preference to QUALCOMM."^{21/} In their Joint Petition, AMT/DSST also stated their belief "that QUALCOMM, like Cylink, has developed superior high capacity spread spectrum radios and produced products based on these designs for the commercial market."^{22/}

The record in this proceeding demonstrates four important "breakthroughs" in digital baseband engineering for which QUALCOMM is responsible and which have helped bring PCS to reality: (1) the coding and signal processing subsystems that incorporate its spread spectrum wave form design; (2) the power control system; (3) the soft handoff system, and (4) the RAKE receiver. QUALCOMM does not believe that it is necessary to review the details of this pioneering technology since they have been documented in previous filings.^{23/}

2. The Second Criterion - Technical Feasibility

There is no question that QUALCOMM has established the technical feasibility of its PCS technology. The end-to-end QUALCOMM system is beyond the testing stage; indeed, APC has been operating QUALCOMM's PCS system for over 18 months in Washington, D.C.^{24/} In addition, experimental progress reports filed by MCI, Time Warner and Cox bear witness to the feasibility of

^{20/} *Third Report and Order* at ¶ 265.

^{21/} AMT/DSST Joint Petition at 22 n.30 (March 7, 1994).

^{22/} *Id.*

^{23/} QUALCOMM must however address the Commission's reliance on Omnipoint's erroneous statement that "soft handoff, which permits a mobile to communicate on one frequency to multiple cells at the same time, reduces capacity" *Third Report and Order* at 23 n.67. It is the mobile-to-base station link that limits the capacity of the QUALCOMM system. That is, the lower the power of each mobile unit, the lower the interface interference to other mobile-to-base station links in the system. Soft handoff coupled with power control always results in less transmitted power, and less interference; thus, the capacity of the system can be increased. QUALCOMM's extensive public testing has proven that soft handoff actually results in a significant capacity *increase* over a system that does not use it.

^{24/} It is, of course, highly ironic that the Commission should grant a pioneer's preference to APC, one of QUALCOMM's customers, and not to QUALCOMM. See GTE Comments, GEN Docket No. 90-314 (Jan. 29, 1993).

the QUALCOMM system.^{25/} Even the Commission begrudgingly admitted the technical feasibility of the QUALCOMM system when it stated that "QUALCOMM's equipment appears viable for the provision of PCS services."^{26/}

3. The Third Criterion - Reasonable Outgrowth

The PCS rules are a direct outgrowth of QUALCOMM's innovative work. In making its allocation, the Commission specifically referred to the capacity of QUALCOMM's system in making its bandwidth decision.^{27/} QUALCOMM's 1.25 MHz FDD system is ready to be deployed in the 20 and 30 MHz bands today. Moreover, the record in this proceeding shows that QUALCOMM has the only system that is compatible with the Commission's 10 MHz allocation.

Not only has the Commission made an allocation decision based on QUALCOMM's system, but the PCS industry also is moving quickly to adopt QUALCOMM's system as a standard for PCS. On November 1, 1993, QUALCOMM and Motorola jointly submitted a proposal based on QUALCOMM's PCS system to the Joint Technical Committee (JTC). In January 1994, AT&T and other leading equipment manufacturers endorsed this proposal. Draft standards text was also submitted to the JTC in January. In addition, the PCS Technology Advocacy Group ("PTAG"), an industry forum of potential PCS providers, such as US West, Sprint, Bell Atlantic and Time Warner, recently announced that it was supporting the adoption of PCS standards based on the Telecommunications Industry Association ("TIA") digital standard IS-95, which is based on QUALCOMM's CDMA technology.

^{25/} MCI First Progress Report, GEN Docket No. 90-314 at 46 (July 19, 1993); Time Warner Eleventh Quarterly Progress Report, GEN Docket No. 90-314 at 9 (Jan. 4, 1994); Cox Enterprises, Inc., Twelfth Quarterly Progress Report, GEN Docket No. 90-314 at 3 (Feb. 22, 1994).

^{26/} *Third Report and Order* at ¶ 266. This statement corrects the statements made by the Commission in its *Tentative Decision*. There, the Commission tentatively concluded "that QUALCOMM does not merit a preference for *just suggesting* their [sic] equipment may be converted from 800 MHz technology to work at 2 GHz." *Tentative Decision* at ¶ 32. A correction was warranted.

^{27/} *Amendment of the Commission's Rules to Establish New Personal Communications Services*, GEN Docket No 90-314, 8 FCC Rcd 7700, 7725 (1993) ("*Second Report and Order*").

II. THE COMMISSION SHOULD RECONSIDER ITS GRANT OF A PREFERENCE TO OMNIPPOINT

The Commission should rescind its grant of a pioneer's preference to Omnipoint. First, the record conclusively demonstrates that Omnipoint has not, and cannot, satisfy the pioneer's preference criteria. Second, the *Third Report and Order* is procedurally deficient and cannot justify the conclusion that Omnipoint has been an innovator deserving a preference. Finally, the Commission should recognize that grant of a preference to Omnipoint undermines the purpose and policies underlying the pioneer's preference rules.

A. Omnipoint Has Failed to Satisfy the Commission's Pioneer's Preference Criteria

1. The First Criterion -- Technological Development

The *Third Report and Order* grants Omnipoint a pioneer's preference without supporting that finding by reference to specific portions of the record. QUALCOMM has reviewed the record and is unable to find evidence for the Commission's conclusion that Omnipoint is responsible for technological developments sufficient to warrant a pioneer's preference. In the *Tentative Decision*, the Commission based its tentative award to Omnipoint on "its equipment development", relying on three specific areas: 1) radio frequency engineering and related spread spectrum product design, development, miniaturization, and deployment of equipment; 2) system architecture that facilitates coexistence with other users of the same frequencies; and 3) design and development of a base station interface that is compatible with advanced features of the PSTN.^{28/}

Neither the Commission nor Omnipoint defines the term radio frequency engineering. The rf portion of communication equipment is associated with the particular transmission frequency allocated to provide a given service. It has almost nothing to do with the baseband signal processing that is the heart of any digital PCS system.

^{28/} *Tentative Decision* at ¶ 19; *Third Report and Order* at ¶ 55.

Regarding Omnipoint's "spread spectrum product design," Omnipoint developed the spread spectrum aspect of its PCS system for operation in the ISM bands, not for 2 GHz PCS. In May 1992, Omnipoint observed that, "the many present and myriad future users of these bands (the ISM bands) will have to design their systems with a high degree of interference rejection. Omnipoint's systems have been designed with this future popularity of the ISM bands in mind, with minimum average true jamming margins on the order of 8 dB to 14 dB."^{29/} Omnipoint used spread spectrum technology as an anti-jamming technology in the ISM band. There is nothing in the record that indicates Omnipoint changed any aspect of its spread spectrum technology when it changed the carrier frequency of its equipment. Such a change would be inconsistent with Omnipoint's claim that its equipment can switch between the licensed and unlicensed bands.

QUALCOMM is puzzled by the Commission's determination that Omnipoint's handsets can operate at multiple frequencies and that this merits a preference.^{30/} The Commission has failed to cite to any test demonstrating an Omnipoint handset with frequency switching capabilities. Moreover, QUALCOMM questions whether dual mode phones are inherently innovative. Similar capabilities are currently available in existing services and are being developed for many soon to be introduced services.^{31/}

2. The Second Criterion -- Technical Feasibility

Counter to the record in this proceeding, the *Third Report and Order* incorrectly concludes that Omnipoint has established the feasibility of its system. It appears that the Commission's

^{29/} Omnipoint Semi-Annual Experimental License Report - Call Sign KF2XEH, File No. 1629-EX-PL-90 at 4-3 (May 1992).

^{30/} See *Third Report and Order* at ¶¶ 60 & 74.

^{31/} As the Commission is aware all new digital cellular phones will be dual mode with both digital and AMPS capability. In addition, at least one carrier is offering dual mode operation that provides free airtime service in the office environment and regular cellular service outside the office. Finally, both Motorola's Iridium and Loral-QUALCOMM's Globalstar have proposed dual mode operation, offering both satellite and terrestrial service from the same mobile units.

conclusion was based on findings that Omnipoint had established (1) its equipment's ability to promote frequency sharing with other users of the 1850-1990 MHz band, such as fixed microwave licensees, (2) its development of an innovative interface between its base station and the public switched telephone network and (3) its ability to support multicell operations.^{32/} Before turning to the Commission's three findings, QUALCOMM will demonstrate that the Commission's reliance on reports cited by Omnipoint was misplaced.

(a) Reports about System Functionality

QUALCOMM has asserted throughout this proceeding that Omnipoint has failed to demonstrate a functional system. The *Third Report and Order* incorrectly dismisses QUALCOMM's claims, finding that Omnipoint and other commenters who tested Omnipoint's equipment have refuted QUALCOMM's conclusions.^{33/} However, the very experiments cited by Omnipoint,^{34/} when examined in greater detail, unambiguously prove that Omnipoint has failed to demonstrate the technical feasibility of its 2 GHz PCS system.

(i) American Portable Telecommunications

Omnipoint claimed in its March 1, 1993 Reply Comments that APT reported that it had begun testing the Omnipoint 1.85-1.99 GHz equipment.^{35/} The Commission appears to accept this claim at face value. But, a close examination of APT's progress report shows that APT's tests involved only 902-928 MHz equipment.

APT began its initial testing on Omnipoint's narrowband [10 MHz] 1.85-1.99 GHz base station and handset equipment. The prototype

^{32/} *Third Report and Order* at ¶¶ 55-74.

^{33/} *Id.* at ¶ 72.

^{34/} QUALCOMM notes that there is no explanation in the record from either Omnipoint or Bell Atlantic Network Services why it never reported any results from the joint tests conducted by these companies that were discussed so prominently in Omnipoint's preference request.

^{35/} Omnipoint Reply Comments, GEN Docket No. 90-314 at 25 (March 1, 1993).

handset used in this test was the smaller Pocket Phone as illustrated on page 13 of our interim report dated June 15, 1992. Omnipoint and other vendors have advised APT that the 1.85-1.99 GHz equipment will be available late in the third quarter or early in the fourth quarter of 1992. APT plans to replace its 902-928 MHz equipment when the 1.85-1.99 GHz equipment becomes available.^{36/}

If the 1.85-1.99 GHz equipment was not available until later in the year, how was APT able to claim it tested the 2 GHz equipment? It is clear from APT's statements that the tests involved Omnipoint's cordless phone, which was illustrated on page 13 of APT's June 15, 1992 report. That report described Omnipoint's equipment as a "cordless telephone" and "902-928 MHz radio equipment."^{37/} Thus, from APT's own reports, it is unquestionable that APT did not test 2 GHz equipment and that these tests could not be used by Omnipoint or the Commission to demonstrate functionality.

(ii) Ameritech

Although Ameritech's 1992 reply comments in this proceeding credit Omnipoint with the "first operational CDMA handset at 1850 MHz,"^{38/} a review of Ameritech's own experimental reports demonstrates the inaccuracy of this statement. It appears that Ameritech first received Omnipoint equipment in 1993.^{39/} Ameritech's initial observation noted the deficiency of the equipment:

While the basic functionality of the equipment was proved, product refinement discussions were continued, with an eye toward comprehensive testing in the first quarter of 1993.^{40/}

^{36/} APT Second Quarterly Experimental License Progress Report - Call Sign KK2XAV, File No. 2126-EX-PL-91 at 5 (July 15, 1992) (emphasis added).

^{37/} APT Interim Report at 13 (June 15, 1992).

^{38/} Ameritech Reply Comments, GEN Docket No. 90-314 at 4 n.3 (June 25, 1992).

^{39/} QUALCOMM notes that Ameritech received the Omnipoint equipment *after* the Commission released its *Tentative Decision* which, nonetheless, cited to Ameritech's tests as a justification for the tentative conclusion that Omnipoint had created a functional system.

^{40/} Ameritech Direct Communications, Inc. Seventh Quarterly Progress Report, File Nos. 1686-EX-PL-90 & 2318-EX-ML-91 at 3 (Jan. 8, 1993).

Neither Ameritech nor Omnipoint ever submitted a single piece of data from an Ameritech experiment conducted with Omnipoint equipment. Even more significant, there is no evidence that Ameritech ever used Omnipoint equipment in its extensive PCS trial. QUALCOMM does not believe the reports Ameritech submitted can be used to support a finding of technical feasibility.

(iii) Cox

Cox did not report on any test of Omnipoint 1800 MHz equipment until after the Commission made its *Tentative Decision*. In its first test of Omnipoint's 1800 MHz equipment, using a single base station and three handsets, Cox found that the 8 microsecond period between transmit and receive in Omnipoint's TDD format limited to 1,000 feet the length of cable over which it could transmit the PCS signal.^{41/} Subsequent reports indicate that, although Omnipoint was able to mitigate this problem, it never solved it. In May 1993, Cox stated that the TDD problem, "was of particular concern to Cox in terms of cost efficiency deploying ubiquitous PCS coverage."^{42/} Cox next stated that Omnipoint's equipment limited "the separation (between base station and remote antennas) to 1.7 miles in air or 1.3 miles in cable" resulting in Cox's conclusion that "[t]his limited separation does not permit the implementation of Cox's vision of centralized modulation."^{43/} The inability of the Omnipoint equipment to provide a functioning system is best summarized in Cox's November 22, 1993 report (a year after the Commission tentatively concluded that Omnipoint had demonstrated a viable technology), in which Cox ends its discussion of the results obtained with the latest version

^{41/} Cox Enterprises, Inc. Seventh Quarterly Progress Report, Experimental License - Call Sign KF2XFR, File No. 1641-EX-PL-90 at 4 (Nov. 19, 1992).

^{42/} Cox Enterprises, Inc. Ninth Quarterly Progress Report, Experimental License - Call Sign KF2XFR, File No. 1641-EX-PL-90 at 21 (May 20, 1993).

^{43/} Cox Enterprises, Inc. Tenth Quarterly Progress Report, Experimental License - Call Sign KF2XFR, File No. 1641-EX-PL-90 at 8 (Aug. 20, 1993).

of the Omnipoint equipment with the statement that it, "will postpone additional testing of this system configuration until improved hardware and software are available."^{44/}

(iv) Southwestern Bell

As is discussed below, the Southwestern Bell tests were designed to evaluate interference. Southwestern Bell conducted two brief tests using the Omnipoint equipment. The first involved the use of a single base station and two handsets. The report about this test does not describe the functionality of the equipment. The second test, performed about one and a half hours later, used two base stations and no handsets.^{45/} Given the brevity and limited nature of these tests, QUALCOMM strongly questions the Commission's ability to rely on these tests to demonstrate the functionality of the Omnipoint system.

(v) Time Warner

Time Warner's first report on Omnipoint's equipment indicates, it tested a "six channel Omnipoint DS-1900 1850 MHz TDMA/CDMA PCS public base station."^{46/} The tests involved outgoing calls without any data or video capabilities and lasted only for a few hours. Subsequent tests reported on demonstrations involving a single base station and one or a very limited number of handsets.^{47/} Interconnection to the PSTN was accomplished using interface equipment supplied by Time Warner, not Omnipoint.^{48/} While these tests may have demonstrated the functionality of Time Warner innovations, all they showed about Omnipoint was that it had upbanded its cordless telephone to 1800 MHz.

^{44/} Cox Enterprises, Inc. Eleventh Quarterly Progress Report, Experimental License - Call Sign KF2XFR, File No. 1641-EX-PL-90 at 3 (Nov. 22, 1993).

^{45/} Southwestern Bell Personal Communications, Third Quarterly Progress Report, Experimental License - Call Sign KK2XFT, File No. 2195-EX-PL-91 at 1-7 through 1-9 (Dec. 17, 1992).

^{46/} Time Warner Sixth Quarterly Progress Report, Experimental Licenses at 17 (Sept. 30, 1992).

^{47/} Time Warner Seventh Quarterly Progress Report, Experimental Licenses at Attachment B, 4 (Dec. 31, 1992).

^{48/} Time Warner Tenth Quarterly Progress Report, Experimental Licenses at 8 (Sept. 14, 1993).

(b) Frequency Sharing

In its comments, QUALCOMM questioned the Commission's findings that the Omnipoint system architecture facilitated coexistence with microwave users. In the *Third Report and Order*, the Commission ignored QUALCOMM's criticism and relied upon Omnipoint's assertion that its experiments with Southwestern Bell Personal Communications disprove QUALCOMM's criticism.^{49/} However, the Commission's reliance on Omnipoint's claims of experiments with SBPC is unfounded. In its report on those experiments, SBPC explicitly stated that "there may have been shadowing of the direct path from the PCN transmit site to the microwave receiver" and that the level of the signal from the Omnipoint equipment at the victim receiver "was not measured directly during the test."^{50/} A single experiment in which the path between the transmitter and the victim receiver is not well understood and in which the interfering signal is not measured, proves nothing about the interference performance of the system.^{51/}

Simply stated, the record does not contain any experimental evidence which demonstrates that Omnipoint's 1800 MHz PCS system can coexist with fixed microwave systems. Although Omnipoint's Reply Comments attached a study entitled "FDM-FM Microwave Link Propagation" containing interference test results,^{52/} this study does not report on tests using Omnipoint's 1800 MHz PCS equipment as a source of interference to microwave users. Instead, Omnipoint tested and reported on a test system using a "Bob Dixon Box" as an interfering source. There is no indication that the "Bob Dixon Box" had the same interference potential as Omnipoint's 2 GHz pulsed PCS

^{49/} *Third Report and Order* at ¶ 72.

^{50/} Southwestern Bell Personal Communications, Inc. Third Quarterly Progress Report, Experimental License - Call Sign KK2XFT, File No. 2195-EX-PL-91 at 1-8 & 1-9 (Dec. 17, 1992).

^{51/} QUALCOMM is puzzled that the Commission has relied on this test to justify Omnipoint's claims of frequency sharing while also concluding that "SBPC has not demonstrated the technical feasibility of using the IMASS to share spectrum with existing microwave systems." *Third Report and Order* at ¶ 138.

^{52/} Omnipoint Reply Comments, GEN Docket No. 90-314 (June 25, 1992).

system. Because these tests did not use Omnipoint's actual system, the report cannot support a finding of frequency sharing capability. Similarly, the Commission cannot rely on the report of Omnipoint's most comprehensive test, which explicitly admits that "the tests were not designed to test the sharing problem" ^{53/}

QUALCOMM's concerns over the frequency sharing capabilities of the Omnipoint system are supported by the tests of at least one other applicant. APT's experimental progress report reveals that the Omnipoint base station was incapable of operating on an interference-free basis in an area in which 902-928 MHz equipment was operating:

Although operation of the Omnipoint equipment was unaffected, the wireless LAN experienced interference and, consequently, the Omnipoint base station was disconnected. ^{54/}

APT also stated that in one of the buildings used for its tests, "the Omnipoint 902-928 MHz equipment caused interruption to paging reception when pagers were in close proximity to the Omnipoint base station." ^{55/}

The interference APT reported is an expected result of the pulsed or gated nature of the Omnipoint waveform. Contrary to the Commission's conclusion that it could "find no basis to question Omnipoint's interference analysis," ^{56/} QUALCOMM notes that, in addition to the evidence APT supplied, QUALCOMM has previously demonstrated how Omnipoint's TDMA system would be a serious source of interference to OFS microwave receivers. ^{57/}

^{53/} Omnipoint Semi-Annual Experimental License Progress Report - Call Sign KK2XCV, File No. 2174-EX-PL-91 at 11 (Aug. 1993).

^{54/} APT Second Quarterly Report, Experimental License - Call Sign KK2XAV, File No. 2126-EX-PL-91 at 3 (July 15, 1992).

^{55/} *Id.*

^{56/} *Third Report and Order* at ¶ 73.

^{57/} See QUALCOMM Comments, GEN Docket No. 90-314 at 20-22 (Jan. 29, 1993). A recent report from New Zealand, detailing how the TDMA GSM system interferes with hearing aids, summarized the problem as follows:
(continued...)

(c) PSTN Compatibility

Omnipoint's pioneer's preference request contained almost no information about the method Omnipoint uses to connect its base stations to the Public Switched Telephone Network (PSTN). Omnipoint stated that its "Base Station to Network Interface is being designed to be Independent of Network Topology."^{58/} The only other information in the Omnipoint request that addresses the network interface is in Attachment C entitled, "Advanced Intelligent Network Capabilities." Attachment C, which appears to be a Bell Atlantic document, described how Bell Atlantic would offer its network services to different service providers. QUALCOMM does not understand what this has to do with Omnipoint's request for a pioneer's preference. Moreover, the record contains no evidence that Omnipoint has demonstrated an innovative interface between its base station and the PSTN. There is no indication in the record that Omnipoint supplied or developed anything other than a standard RJ 11 telephone interconnection between its base station equipment and the PSTN or other non-Omnipoint interface equipment.^{59/}

QUALCOMM also notes that none of the Omnipoint experimental reports describes an Omnipoint PSTN interface. For example, Omnipoint's August 1993 report does not describe how the base stations were interconnected with the PSTN, or if they were. Based on this record there is no justification for a conclusion that Omnipoint has demonstrated an innovative base station interface.

^{57/} (...continued)

The pulse envelope generated by turning the carrier on and off represents a 100% AM modulation of the carrier. The pulse frequencies are within the range amplified by hearing aids and the interference they produce is perceived as a buzzing sound.

Greville, *Digital Cellphone & Interference with Hearing Aid Users*, National Audiology Center, Auckland, New Zealand at 3. This is exactly the phenomenon QUALCOMM predicted.

^{58/} Omnipoint's Pioneer's Preference Request, PP-58 at 10 (May 4, 1992).

^{59/} Multiple reports have indicated that Omnipoint relies on the RJ 11 interconnection. E.g., Cox Seventh Quarterly Experimental License Progress Report, *supra* note 41, at 6; Time Warner Sixth Quarterly Experimental License Progress Report, *supra* note 46, at Attachment II, Figure 2.

(d) Multiple Access/Frequency Reuse

The Commission has similarly failed to cite to any evidence in the record supporting the conclusion in the *Third Report and Order* that the Omnipoint system provides innovative multiple access capabilities.^{60/} None of the experimental reports filed by Omnipoint (or by other parties using Omnipoint equipment) discussed anything more than, at most, a few users operating in simple TDMA mode--no CDMA, no FDMA and no combined method. Indeed, Omnipoint's report on its most comprehensive tests indicates the use of only one mobile unit.^{61/} Certainly the Commission does not believe that operation with a single mobile user demonstrates multiple access capability.

The record also fails to support any finding that Omnipoint's system has frequency reuse capability, a finding necessary to reach the Commission's conclusion that "Omnipoint demonstrated the feasibility of multicell operations"^{62/} To demonstrate frequency reuse, it is necessary to show *simultaneous* co-channel operation on nearby cells using the same frequency, and in Omnipoint's case, the same time slot.^{63/} There is no evidence in the record that Omnipoint ever demonstrated such a capability. For example, in Omnipoint's New York tests, Omnipoint never operated mobile units simultaneously in different cells using the same frequency.^{64/} Instead, a single mobile unit moved between cells operating at different frequencies. This was not a demonstration of frequency reuse.

^{60/} "[Omnipoint's system] allows for both transmit and receive on the same frequency channel (TDD) and multiple users on the same frequency channel (TDMA) while also providing for multiple cells on the same frequency channel by using spread spectrum and associated CDMA technology or by using different frequency channels (FDMA) with CDMA." *Third Report and Order* at ¶ 67.

^{61/} Omnipoint Semi-Annual Experimental License Progress Report, *supra* note 53, at 19.

^{62/} *Third Report and Order* at ¶ 67.

^{63/} The Bell System Technical Journal describes frequency reuse as: "the use of radio channels on the same carrier frequency to cover different areas which are separated from one another by sufficient distances so that co-channel interference is not objectionable." MacDonald, *The Cellular Concept*, 56 The Bell Systems Technical Journal, January 1979, No. 1 at 16.

^{64/} Omnipoint Semi-Annual Experimental License Progress Report, *supra* note 53, at 19.

3. The Third Criterion -- Reasonable Outgrowth

In attempting to justify its award to Omnipoint, the Commission stated that, "the rules we are adopting are a reasonable outgrowth of Omnipoint's proposal and reflect Omnipoint's development of equipment in the 1850-1990 MHz band." Although Omnipoint has never revealed the details of its PCS system, a review of the experimental record shows that Omnipoint's system has the following technical characteristics: time division duplexing (TDD); 10 MHz system bandwidth; N=3 reuse factor. Even a cursory comparison of the Commission spectrum allocation rules and the known Omnipoint equipment parameters shows that the rules could not have been a reasonable outgrowth of Omnipoint's proposal.

All the channels the Commission allocated have upper and lower blocks, which is ideal for frequency division duplexing (FDD) operation, not for Omnipoint's TDD method. More important, with a 10 MHz bandwidth, Omnipoint's equipment cannot operate in the 10 MHz allocation.

Omnipoint's 10 MHz TDD equipment could operate in the 20 MHz channel, but only in an N=1 reuse pattern, which Omnipoint states is less than ideal. The Omnipoint equipment is especially unsuited to the two 30 MHz channel allocations. Although Omnipoint could operate its equipment in the less than ideal N=1 reuse pattern, this would waste one third of the allocation. In sum, it is very difficult for the Commission to justify its conclusion that its rules are an outgrowth of a proposal that will operate so inefficiently under those rules.

B. The Third Report and Order's Grant of a Preference to Omnipoint is Procedurally Defective

In the *Third Report and Order*, the Commission did not engage in any independent analysis of the technical record. Most of the text concerning Omnipoint merely recites the positions of the parties. The Commission does not engage in any balancing or weighing of the arguments, but merely

repeats Omnipoint's claims.^{65/} The Commission did not, in any way, articulate with clarity the basis for its decision or identify the significance of the crucial facts. The Commission is under an affirmative obligation to provide a justification for its decisions; the courts have repeatedly determined that the Commission's failure to justify its decisions required remand.^{66/}

In addition to the Commission's failure to adequately justify its decision, the text of the decision itself is so riddled with errors as to call into question the integrity of the entire *Third Report and Order*. For example, the footnotes used to support the Commission's summary of Omnipoint's reply comments actually cite to the pleadings of other parties.^{67/} Although QUALCOMM appreciates the potential for typographical errors in any 96 page document, QUALCOMM contends that these errors rise to a different level and indicate a fundamental flaw in the reasoning and support for the Commission's award.

Other mistakes in the text underscore the Commission's misunderstanding of the nature of the Omnipoint system and call into question the validity of the Commission's decision. For example, the Commission states, "Omnipoint argues that other CDMA systems have multiple users transmitting on the same frequency at the same time, which increases the level of interference, while its system is distinguished by its use of TDD to separate users in time."^{68/} The abbreviation TDD, however, refers to time division duplexing, a technology which allows for two-way communications using the same carrier frequency. It does not refer to or in any way implicate multiple access techniques whereby multiple users gain simultaneous access to the same spectrum. The Commission's

^{65/} See *infra* note 81.

^{66/} See *supra* notes 4 & 5.

^{67/} *Third Report and Order* at ¶¶ 65 & 66, nn. 75 & 76 and ¶ 72, n.81. Paragraphs 65 and 66 discuss Omnipoint's replies to Bell Atlantic's comments, yet the related footnotes 75 and 76 cite to the Bell Atlantic comments, not Omnipoint's reply. Similarly, in ¶ 72, the Commission states, "Omnipoint replies that experiments with SBPC disprove this claim." However, the Commission cites a QUALCOMM pleading as support for this Omnipoint assertion.

^{68/} *Id.* at ¶ 52.